IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellants:	Borran, *et al.*
Title:	METHOD AND APPARATUS TO ESTABLISH CONSTELLATIONS FOR IMPERFECT CHANNEL STATE INFORMATION AT A RECEIVER
Appl. No.:	10/523,167
Filing Date:	3/10/2006
Examiner:	Kevin Michael Burd
Art Unit:	2611
Confirmation Number:	8220

REPLY BRIEF

Mail Stop Appeal Brief - Patents
P.O. Box 1450
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Sir/Madam:

This Reply Brief is being filed in response to an Examiner's Answer mailed June 28, 2010, rejecting Claims 26-53. As a result, the submission of this Reply Brief under the provisions of 37 C.F.R. § 41.41 is timely. Appellants do not believe that a fee is due for this filing. However, if a fee is deemed to be due, the Commissioner is hereby authorized to charge any deficiency (or credit any balance) to Deposit Account 19-0741.

Appellants respectfully request reconsideration of the Application.

REAL PARTY IN INTEREST

The real party in interest is Spyder Navigations L.L.C., the assignee of record, having a place of business at 1209 Orange Street, Wilmington, Delaware 19801 USA. The assignment to Spyder Navigations L.L.C. was recorded in the records of the United States Patent and Trademark Office at Reel/Frame 019893/0540 on September 28, 2007.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences that will directly affect, be directly affected by, or have a bearing on the present appeal, that are known to Appellants or Appellants' patent representative.

STATUS OF CLAIMS

The present appeal is directed to Claims 26-53, all of which stand rejected pursuant to a Final Office Action dated October 15, 2009. Claims 1-25 have been canceled. Claims 26-53 are pending and are being appealed. Claims 1-53 with the appropriate status reference are shown in the attached Claims Appendix.

STATUS OF AMENDMENTS

A Final Office Action dated October 15, 2009, was received by Appellants. An After Final Response was filed December 15, 2009. In the After Final Response, no claims were amended. Claims 1-25 had been canceled previously. In the Advisory Action dated December 31, 2009, the Examiner maintained the finality of the office action and the rejection of Claims 26-53. No amendments have been made in the present Application subsequent to receipt of the Final Office Action dated October 15, 2009.

SUMMARY OF CLAIMED SUBJECT MATTER

Seven independent claims, Claims 26, 35, 46, 47, 49, 51, and 53, are under appeal and argued below as a group.

Claim 26 is directed to a method for processing a received signal. The method comprises:

selecting a signal constellation, at a communication device, based on a channel estimation error (*e.g.,* 108, Fig. 1; 600, Fig. 6; 600E, Fig. 6; 708, Fig. 7B; p. 11, l. 9 - p. 13, l. 27; p. 14, ll. 18-20);

receiving a modulated signal at a receiver of the communication device (*e.g.,* 100, Fig. 1; 600A, Fig. 6; 706, Fig. 7B; p. 5, l. 20 - p. 6, l. 6; p. 6, ll. 11-30; p. 13, l. 28 - p. 14, l. 10; p. 14, l. 18); and

demodulating the modulated signal at a detector module of the communication device by selecting a point from the selected signal constellation corresponding to the modulated signal (*e.g.,* 108, Fig. 1; 600, Fig. 6; 710, Fig. 7B; p. 14, ll. 20-23).

Claim 35 is directed to a network element. The network element comprises:

a receiver module corresponding to an antenna, wherein the receiver module is configured to receive a modulated signal from a second network element (*e.g.,* 100, Fig. 1; 600A, Fig. 6; 706, Fig. 7B; p. 5, l. 20 - p. 6, l. 6; p. 6, ll. 11-30; p. 13, l. 28 - p. 14, l. 10; p. 14, l. 18); and

a detector module configured to select a signal constellation based on a channel estimation error (*e.g.,* 108, Fig. 1; 600, Fig. 6; 600E, Fig. 6; 708, Fig. 7B; p. 11, l. 9 - p. 13, l. 27; p. 14, ll. 18-20) and to demodulate the modulated signal by selecting a point from the signal constellation corresponding to the modulated signal (*e.g.,* 108, Fig. 1; 600, Fig. 6; 710, Fig. 7B; p. 14, ll. 20-23).

Claim 46 is directed to a network element. Claim 46 is a means plus function claim as permitted by 35 U.S.C. 112, ¶ 6. The network element comprises:

means for receiving a modulated signal from a second network element (*e.g.,* 100, Fig. 1; 101, Fig. 1; 600A, Fig. 6; 706, Fig. 7B; p. 5, l. 20 - p. 6, l. 6; p. 6, ll. 11-30; p. 13, l. 28 - p. 14, l. 10; p. 14, l. 18);

means for selecting a signal constellation based on a channel estimation error (*e.g.,* 108, Fig. 1; 600, Fig. 6; 600E, Fig. 6; 708, Fig. 7B; p. 11, l. 9 - p. 13, l. 27; p. 14, ll. 18-20); and

means for demodulating the modulated signal by selecting a point from the signal constellation corresponding to the modulated signal (*e.g.,* 108, Fig. 1; 600, Fig. 6; 710, Fig. 7B; p. 14, ll. 20-23).

Claim 47 is directed to a detection module. The detection module comprises:

an input component configured to receive a signal (*e.g.,* 106, 106a, Fig. 1; p. 6, ll. 5-6; p. 6, ll. 11-24); and

a detection component configured to select a signal constellation based on a channel estimation error (*e.g.,* 108, Fig. 1; 600, Fig. 6; 600E, Fig. 6; 708, Fig. 7B; p. 11, l. 9 - p. 13, l. 27; p. 14, ll. 18-20) and to demodulate the received signal by selecting a point from the signal constellation corresponding to the received signal (*e.g.,* 108, Fig. 1; 600, Fig. 6; 710, Fig. 7B; p. 14, ll. 20-23).

Claim 49 is directed to a computer-readable medium having computer-readable instructions stored thereon that, when executed by a processor, cause a computing device to:

receive a modulated signal (*e.g.,* 100, Fig. 1; 101, Fig. 1; 600A, Fig. 6; 706, Fig. 7B; p. 5, l. 20 - p. 6, l. 6; p. 6, ll. 11-30; p. 13, l. 28 - p. 14, l. 10; p. 14, l. 18);

select a signal constellation based on a channel estimation error (*e.g.,* 108, Fig. 1; 600, Fig. 6; 600E, Fig. 6; 708, Fig. 7B; p. 11, l. 9 - p. 13, l. 27; p. 14, ll. 18-20); and

demodulate the modulated signal by selecting a point from the signal constellation corresponding to the modulated signal (*e.g.,* 108, Fig. 1; 600, Fig. 6; 710, Fig. 7B; p. 14, ll. 20-23).

Claim 51 is directed to a method for communicating a signal. The method comprises:

selecting a point from a signal constellation at a selection module based on a channel estimation error (*e.g.,* 108, Fig. 1; 600, Fig. 6; 600E, Fig. 6; 702, Fig. 7A; p. 11, l. 9 - p. 13, l. 27; p. 14, ll. 18-20);

modulating the signal at a modulator using the selected point (*e.g.,* 108, Fig. 1; 600, Fig. 6; 704, Fig. 7A; p. 5, ll. 5-10; p. 6, ll. 7-15); and

transmitting the modulated signal from a first network element to a second network element (*e.g.,* 100, Fig. 1; 101, Fig. 1; 600A, Fig. 6; 704, Fig. 7A; p. 14, l. 11).

Claim 53 is directed to a network element. The network element comprises:

a selection module configured to select a point from a signal constellation based on a channel estimation error (*e.g.,* 108, Fig. 1; 600, Fig. 6; 600E, Fig. 6; 702, Fig. 7A; p. 11, l. 9 - p. 13, l. 27; p. 14, ll. 18-20);

a modulator configured to modulate the signal using the selected point (*e.g.,* 108, Fig. 1; 600, Fig. 6; 704, Fig. 7A; p. 5, ll. 5-10; p. 6, ll. 7-15); and

a transmitter configured to transmit the modulated signal to a second network element (*e.g.,* 100, Fig. 1; 101, Fig. 1; 600A, Fig. 6; 704, Fig. 7A; p. 14, l. 11).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

One ground of rejection is presented for review in this appeal:

1) The rejection of Claims 26, 35, 46, 47, 49, 51, and 53 under 35 U.S.C. § 102(e) as being unpatentable over U.S. Patent No. 6,560,445 to Fette *et al.* (*Fette*).

ARGUMENT

I. LEGAL STANDARDS UNDER 35 U.S.C. 102(e)

35 U.S.C. § 102(e) provides that "a person shall be entitled to a patent unless ... the invention was described in - (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the Appellant for patent." A prior art reference, as defined by 35 U.S.C. 102, is said to "anticipate" a claimed invention if each and every element of the claimed invention is disclosed, either expressly or inherently, in the prior art reference. *In re Spada*, 911 F.2d 705, 708, 15 U.S.P.Q.2d 1655, 1657 (Fed. Cir. 1990). In deciding the issue of anticipation, one must identify the elements of the claims, determine their meaning in light of the specification and prosecution history, and identify corresponding elements disclosed in the allegedly anticipating reference. *Lindemann Maschinenfabrik v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458, 221 U.S.P.Q. 481, 485-86 (Fed. Cir. 1984).

The Federal Circuit explained the requirements for anticipation in *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 218 U.S.P.Q. 781 (Fed. Cir. 1983), by stating:

> The law of anticipation does not require that the reference "teach" what the subject patent teaches. Assuming that a reference is properly "prior art," it is only necessary that the claims under attack, as construed by the court, "read on" something disclosed in the reference, *i.e.*, all limitations of the claim are found in the reference, or "fully met" by it.

Id. at 772, 218 U.S.P.Q. at 789.

Extrinsic evidence from those skilled in the art can be used to explain, but not to expand the meaning of a disclosed element in that single prior art reference, to determine whether the reference anticipates the claims at issue. *In re Baxter Travenol Labs.*, 952 F.2d 388, 21 U.S.P.Q.2d 1281 (Fed. Cir. 1991).

II. REJECTION OF CLAIMS 26, 35, 46, 47, 49, 51, and 53 UNDER 35 U.S.C. 102(e)

In section 6 of the Final Office Action, Claims 26, 27, 30, 31, 35, 36, 39, 40, 44-49, and 51-53 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,560,445 to Fette *et al.* (*Fette*). For at least the reasons given below, Appellants submit that the Examiner's rejection of Claims 26, 35, 46, 47, 49, 51, and 53 is improper and should be reversed. Appellants' arguments with regard to Claims 26, 35, 46, 47, 49, 51, and 53 stand as presented in the Appeal Brief in addition to arguments set forth below addressing the Examiner's response to Appellants' arguments.

1. *Fette* fails to disclose the claimed "selecting a signal constellation, at a communication device, based on a channel estimation error."

Claim 26 recites in part "selecting a signal constellation, at a communication device, based on a channel estimation error." Claims 35, 46, 47, 49, 51, and 53, though of different scope, recite a similar feature.

On page 13 of the Examiner's Answer, the Examiner contends that a signal-to-noise ratio (SNR) represents the claimed channel estimation error. Specifically, the Examiner asserts that the SNR is an estimate of the quality of a channel used in a communication. On pages 13 and 14 of the Examiner's Answer, the Examiner contends:

> The SNR of Fette is an estimation of the quality of a channel used in communication. The level of the signal present in the channel is determined as is the level of the noise present in the channel to determine the signal-to-noise ratio (SNR). When a noise level of zero is present, the channel is equal to an ideal channel. When a noise level is greater than zero, the present channel is not ideal and a channel estimation error is present. Channel estimation error is the difference between the ideal or expected channel and the present channel. The difference or error is determined and represents the noise/interference/distortion present in the channel. The distortion level of the channel can be represented in a number of ways such as SNR, BER, number of errors, etc, to achieve a measure or estimation of a channel. Therefore, the representation of the channel by using the SNR will represent those channel estimation errors.

Appellants respectfully disagree with the Examiner's interpretation.

Appellants assert that SNR and channel estimation errors are different from one another. Paragraph [0022] of the present application describes one aspect of channel estimation:

> It is typical of the radio path that a transmitted signal arrives at a receiver along a plurality of propagation paths, each having a specific time delay, channel properties also change as a function of time. For example, beams reflected and delayed on the radio path cause so-called inter-symbol interference (ISI). **The frequency response, or impulse response, of a channel can be estimated by the use of a discrete-timed filter channel estimator, whose filter tap coefficients model the radio channel. Such a channel estimator is used to describe the state of a radio channel, and refers generally to a mechanism for estimating and maintaining a description of the complex impulse response of a radio channel.**
>
> (Emphasis added)

Appellants thus submit that a signal to noise ratio is separate and distinct from the channel estimation error. For at least these reasons, Appellants respectfully submit that *Fette* fails to teach, suggest, or describe all of the elements recited in at least independent Claims 26, 35, 46, 47, 49, 51, and 53. A rejection under 35 U.S.C. § 102 cannot be properly maintained where the reference fails to teach each and every element of the rejected claims. The remaining claims depend from one of Claims 26, 35, 47, or 51. Thus, for at least this reason, Appellants respectfully request withdrawal of the rejection of Claims 26-53.

2. The Examiner's interpretation of "a channel estimation error" fails to consider the specification of the present application.

In *Phillips v. AWH Corporation et al.*, the United States Court of Appeals for the Federal Circuit provided a detailed overview concerning how the terms of a claim should be interpreted. 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In *Phillips*, the court reaffirmed the principle that the specification of a patent can be particularly important when determining the prior meaning of claim terms, noting that the specification can act as a dictionary when it

defines terms used in the claims. *Id.* at 1321. To this point, the court emphasized that a claim term may be defined in the specification by implication, without an express definition. *Id. See also, Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295 (Fed. Cir. 2004) ("Even when guidance is not provided in explicit definitional format, the specification may define claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents.") This position is consistent with the MPEP, where Section 2111.01 notes:

> The specification should also be relied on for more than just explicit lexicography or clear disavowal of claim scope to determine the meaning of a claim term when applicant acts as his or her own lexicographer; the meaning of a particular claim term may be defined by implication, that is, according to the usage of the term in the context in the specification.

In the present case and with regard to independent Claims 26, 35, 46, 47, 49, 51, and 53, the Examiner has clearly failed to consider the content of the specification in relation to the claimed element "selecting a signal constellation, at a communication device, based on a channel estimation error." Claims 27, 36, and 52, each of which depends upon one of the independent Claims, recite in part "wherein the constellation is **further selected based on a signal to noise ratio.**" (Emphasis added).

The Examiner has continued to maintain his assertion that the claimed element of "a signal to noise ratio" is narrowing of the "channel estimation error" element. Appellants have clearly noted that the specification defines "channel estimation error" as separate and distinct from a signal-to-noise-ratio. This distinction is clearly illustrated in Figure 6 of the present application, which is provided in full below.

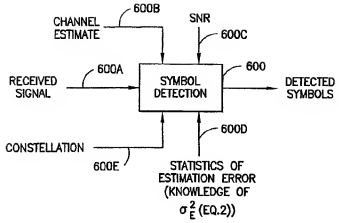

FIG.6

As shown in Figure 6, a symbol detection block 600 receives a channel estimate 600B and a statistics of estimation error 600D **in addition** to a signal-to-noise ratio 600C. The Examiner's interpretation of "channel estimation error" would eviscerate the symbol detection block receiving a signal-to-noise ratio separate from a channel estimate and statistics of estimation error as clearly described in the specification of the present application.

Appellants thus submit that channel estimation error is separate and distinct from a signal-to-noise ratio. For at least these reasons, Appellants respectfully submit that *Fette* fails to teach, suggest, or describe all of the elements recited in at least independent Claims 26, 35, 46, 47, 49, 51, and 53. A rejection under 35 U.S.C. § 102 cannot be properly maintained where the reference fails to teach each and every element of the rejected claims. The remaining claims depend from one of Claims 26, 35, 47, or 51. Thus, for at least this reason, Appellants respectfully request withdrawal of the rejection of Claims 26-53.

CONCLUSION

In view of the foregoing discussion and arguments, Appellants respectfully submit that Claims 26-53 are not properly rejected under 35 U.S.C. § 103(a) as being unpatentable over *Fette* alone or in combination with any of *Seshadri*, *Dabak*, and *Hui*. Accordingly, Appellants respectfully request that the Board reverse all claim rejections and indicate that a Notice of Allowance respecting all pending claims should be issued.

Respectfully submitted,

Date: August 13, 2010

By: _____

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CLAIMS APPENDIX

1.-25. (Canceled)

26. (Previously Presented, Appealed) A method for processing a received signal, the method comprising:

selecting a signal constellation, at a communication device, based on a channel estimation error;

receiving a modulated signal at a receiver of the communication device; and

demodulating the modulated signal at a detector module of the communication device by selecting a point from the selected signal constellation corresponding to the modulated signal.

27. (Previously Presented, Appealed) The method of claim 26, wherein the signal constellation is further selected based on a signal to noise ratio.

28. (Previously Presented, Appealed) The method of claim 26, wherein the modulated signal is received by multiple receive antennas.

29. (Previously Presented, Appealed) The method of claim 26, further comprising decoding the demodulated signal using an outer code that includes codes over a plurality of signal matrices across time.

30. (Previously Presented, Appealed) The method of claim 26, further comprising transmitting an indication of a current signal to noise ratio from the communication device to a second communication device.

31. (Previously Presented, Appealed) The method of claim 26, further comprising storing a plurality of signal constellations in a memory of the communication device.

32. (Previously Presented, Appealed) The method of claim 26, wherein the signal constellation is designed based on a minimum Kullback-Leibler distance between signal constellation points.

33. (Previously Presented, Appealed) The method of claim 26, wherein demodulating the modulated signal comprises performing maximum likelihood demodulation.

34. (Previously Presented, Appealed) The method of claim 26, wherein the demodulating the modulated signal comprises performing coherent demodulation.

35. (Previously Presented, Appealed) A network element comprising:

a receiver module corresponding to an antenna, wherein the receiver module is configured to receive a modulated signal from a second network element; and

a detector module configured to select a signal constellation based on a channel estimation error and to demodulate the modulated signal by selecting a point from the signal constellation corresponding to the modulated signal.

36. (Previously Presented, Appealed) The network element of claim 35, the detector module is further configured to select the signal constellation based on a signal to noise ratio.

37. (Previously Presented, Appealed) The network element of claim 35, further comprising multiple receiver modules corresponding to multiple receive antennas, wherein the multiple receiver modules are configured to receive the modulated signal.

38. (Previously Presented, Appealed) The network element of claim 35, wherein the detector module is further configured to decode the demodulated signal using an outer code that includes codes over a plurality of signal matrices across time.

39. (Previously Presented, Appealed) The network element of claim 35, further comprising a transmit module configured to transmit an indication of a current signal to noise ratio.

40. (Previously Presented, Appealed) The network element of claim 35, further comprising a memory configured to store the signal constellation in a look-up table.

41. (Previously Presented, Appealed) The network element of claim 35, wherein the signal constellation is designed based on a largest minimum Kullback-Leibler distance between signal constellation points.

42. (Previously Presented, Appealed) The network element of claim 35, wherein the detector module is further configured to perform maximum likelihood demodulation.

43. (Previously Presented, Appealed) The network element of claim 35, wherein the detector module is further configured to perform coherent demodulation.

44. (Previously Presented, Appealed) The network element of claim 35, wherein the network element comprises part of a base station or a mobile station.

45. (Previously Presented, Appealed) The network element of claim 35, wherein the detector module is configured to receive the channel state information and the signal constellation.

46. (Previously Presented, Appealed) A network element comprising:

means for receiving a modulated signal from a second network element;

means for selecting a signal constellation based on a channel estimation error; and

means for demodulating the modulated signal by selecting a point from the signal constellation corresponding to the modulated signal.

47. (Previously Presented, Appealed) A detection module comprising:

an input component configured to receive a signal; and

a detection component configured to select a signal constellation based on a channel estimation error and to demodulate the received signal by selecting a point from the signal constellation corresponding to the received signal.

48. (Previously Presented, Appealed) The detection module of claim 47, wherein the input component is further configured to receive the channel estimation error, a signal-to-noise ratio, and the signal constellation.

49. (Previously Presented, Appealed) A computer-readable medium having computer-readable instructions stored thereon that, when executed by a processor, cause a computing device to:

receive a modulated signal;

select a signal constellation based on a channel estimation error; and

demodulate the modulated signal by selecting a point from the signal constellation corresponding to the modulated signal.

50. (Previously Presented, Appealed) The computer-readable medium of claim 49, wherein the signal constellation is designed based on a largest minimum Kullback-Leibler distance between signal constellation points.

51. (Previously Presented, Appealed) A method for communicating a signal, the method comprising:

selecting a point from a signal constellation at a selection module based on a channel estimation error;

modulating the signal at a modulator using the selected point; and

transmitting the modulated signal from a first network element to a second network element.

52. (Previously Presented, Appealed) The method of claim 51, wherein selecting the point from the signal constellation is further based on a signal-to-noise ratio.

53. (Previously Presented, Appealed) A network element comprising:

a selection module configured to select a point from a signal constellation based on a channel estimation error;

a modulator configured to modulate the signal using the selected point; and

a transmitter configured to transmit the modulated signal to a second network element.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.